The Examiner has rejected claims 1-5, 6-11, 13-18 and 20 under 35 U.S.C. §103 as being unpatentable over Kinsman in view of Terashima and Yamaguchi. Additional claims have been rejected in reliance of the above with Yamashita.

The rejection is respectfully traversed for the following reasons.

The principal reference of Kinsman cannot be read on the claims as proposed by the Examiner in the rejection of claims 1-4, 6-11, 13-18 and 20.

In this regard, the heat sink of Kinsman which is attached to the second surface of the die is encapsulated and therefore, cannot meet the limitation in claims 1, 8, 15 and 20 which require said heat sink to be exposed to ambient atmosphere and not encapsulated. Although a portion 96 of the heat sink in Kinsman is not encapsulated the major portion of the heat sink is encapsulated. The defined heat sink in the claims is exposed in entirety to the atmosphere and no part thereof is encapsulated. It is especially important for the part of the sink which is connected to the die pad not to be encapsulated.

Kinsman discloses placing the heat sink inside the lower mold (see Fig. 1A) before it is encapsulated. In contrast, the heat sink of the present invention is outside the encapsulant and is mounted on the die pad and leads with a thermally conductive and electrically insulating adhesive glue. The

disadvantages of the Kinsman patent follows from its objective as outlined by its stated improvements (see the summary of the invention of the Kinsman patent specification), and these disadvantages are:

1) since the heat sink and the encapsulant have different CTE (Coefficient of Thermal Expansion), when the structure of the Kinsman patent is exposed to expansion and shrinkage, the effect of thermal stress will be induced at the contact surface between the heat sink and the encapsulant, and delamination will occur therebetween;

2) the compound bodies inside the upper mold and lower mold are not the same, and the package structure of Kinsman will become warped due to different shrinkage after cooling. The moisture in the atmosphere will permeate into cracks in the encapsulant caused by delamination of warping, and the reliability of the semiconductor package will be reduced;

3) the structure of Kinsman has a basic thickness due to the portion of a heat sink inside the encapsulant and the residual portion outside the encapsulant. In conclusion, it is not suitable for thin packages having a thickness less than 1.00 mm.

Therefore, Applicant disagrees with the Examiner's application of Kinsman to the claims.

Terashima has been cited by the Examiner for meeting the lack in Kinsman of a die pad to which the die is attached.

Terashima discloses a semiconductor device with a PBGA structure comprising a wiring board formed by copper foils on the surfaces of a resin board. Though Terashima discloses a die pad 4 for fixing the chip on the wiring board, the die pad 4 is an isolated portion of the copper foil on the wiring board obtained after the copper foil was etched to form circuit traces. On the contrary, the die pad of the invention is a portion of the leadframe made of alloy, and is capable of fixing and supporting a chip without a resin board thereunder. In conclusion, the die pads of Terashima are of different construction and purpose from that of the invention and would not be obvious to extract the teaching of Terashima for inclusion in Kinsman.

Yamaguchi has been cited additionally in respect of the die pad with the hole. Yamaguchi discloses a semiconductor device comprising a leadframe having a die pad with holes. Therefore, resin material can flow downwards in the holes. On the contrary, the invention discloses a leadframe with a central-hole die pad. The hole is located at the middle of the die pad, and is under the chip, which is mounted on the central-hole die pad. Resin material is blocked by the chip from downward flow in the hole. The present invention utilizes the hole for a glue and a heat sink and this is totally outside the disclosure in Yamaguchi.

Additionally, the Examiner cites Yamaguchi for the heat radiator 17 therein. Yamaguchi discloses a semiconductor device with a film carrier type element, and the backside of the chip is adhered with a heat sink. One of ordinary skill in the art will be aware of the difference in packaging process and materials between a film carrier type package and a leadframe package. Moreover, the combination of elements and objectives of Yamaguchi are completely different from the invention and its combination with Kinsman and Yamashita is not obvious..

By reason of the above it is respectfully submitted that the references cited by the Examiner are not relevant to the present invention nor to one another to justify a rejection of the claims under 35 U.S.C. § 103.

Favorable reconsideration is therefore earnestly solicited.

Respectfully submitted,

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Marked-up Copy of the Claims

1. (Twice Amended) A semiconductor package for enhancing heat dissipation, comprising:

a die having an active surface;

a leadframe, including:

a die pad having a first surface and a second surface, said die being attached to said first surface of the die pad; and

a plurality of leads electrically connected to the active surface of said die, said leads having a surface;

an [encapsulating] encapsulant sealing said die and at least a portion of the surface of the leads in said leadframe; and

a heat sink attached to the second surface of said die pad and at least a portion of the surface of leads in said plurality of leads with a thermally conductive and electrically insulating adhesive glue, said heat sink being exposed to ambient atmosphere and not encapsulated in said encapsulant.